I claim:

1. A matrix-vector analog optical processor device comprising:

a first optical device representing a matrix and having non-uniformities; and,

a second optical device representing a vector and having non-uniformities at least substantially matched to the non-uniformities of the first optical device, such that optical interconnections between the first optical device and the second optical device are irregular,

wherein light traveling through the first optical device and the second optical device represents a matrix-vector product of the matrix represented by the first optical and the vector represented by the second optical device.

2. The device of claim 1, further comprising an analog-to-digital processor to minimize errors in the matrix-vector product after substantially matching the non-uniformities of the second optical device to the non-uniformities of the first optical device.

3. The device of claim 2, wherein the analog-to-digital processor minimizes errors in the matrix-vector product that remain by one of electrical and photonic processing.

4. The device of claim 1, further comprising a detector array to detect the light traveling through the first optical device and the second optical device representing the matrix-vector product.

5. The device of claim 4, further comprising one or more prisms to achieve the irregular optical interconnections between the second optical device and the detector array.

6. The device of claim 1, further comprising one or more prisms to achieve the irregular optical interconnections between the first optical device and the second optical device.

7. The device of claim 1, further comprising one or more prisms to achieve the irregular optical interconnections between any two devices.

8. The device of claim 1, further comprising an electrical driver for each of the first and the second optical devices.

9. The device of claim 1, further comprising a light source to provide the light traveling through the first optical device and the second optical device.

10. The device of claim 1, wherein at least one of the first and the second optical devices is a spatial light modulator (SLM).

11. The device of claim 1, wherein the first optical device comprises a plurality of sub-devices organized into a plurality of groups, each group representing a vector, the sub-devices of the group representing a grayscale response of the component of the vector.

12. The device of claim 1, wherein the second optical device comprises a plurality of sub-devices organized into a plurality of groups, each group representing a row of the matrix,

the sub-devices of the group representing a grayscale response of the component of the row of the matrix.

13. A method comprising:

substantially matching non-uniformities of a first optical device representing a vector with non-uniformities of a second optical device representing a matrix;

optically interconnecting the first optical device with the second optical device in an irregular manner consistent with the substantially matching of the non-uniformities of the first optical device with the non-uniformities of the second optical device; and,

providing light traveling through the first optical device and the second optical device along the irregular manner to yield a matrix-vector product of the vector represented by the first optical device and the matrix represent by the second optical device.

14. The method of claim 13, further initially comprising characterizing the non-uniformities of the first optical device and the non-uniformities of the second optical device.

15. The method of claim 14, further comprising increasing the matching of the non-uniformities of the first optical device and the non-uniformities of the second optical device by using optical devices with a greater number of sub-devices in at least one of the optical devices than is necessary for the matrix-vector processor.

16. The method of claim 13, further comprising minimizing errors in the matrix-vector product after substantially matching the non-uniformities of the first optical device with the non-uniformities of the second optical device.

17. The method of claim 16, wherein subtracting any errors in the matrix-vector product comprises using an analog-to-digital processor.

18. The method of claim 16, wherein subtracting any errors in the matrix-vector product comprises electrically processing the matrix-vector product.

19. The method of claim 13, further comprising detecting the light after traveling through the first optical device and the second optical device to measure the matrix-vector product.

20. The method of claim 13, wherein optically interconnecting the first optical device with the second optical device in the irregular manner comprises using one or more prisms.

21. The method of claim 13, wherein at least one of the first and the second optical devices is a spatial light modulator (SLM).

22. The method of claim 13, wherein the first optical device comprises a plurality of sub-devices organized into a plurality of groups, each group representing a vector, the sub-devices of the group representing a grayscale response of the component of the vector.

23. The method of claim 13, wherein the second optical device comprises a plurality of sub-devices organized into a plurality of groups, each group representing a row of the matrix, the sub-devices of the group representing a grayscale response of the row of the matrix.

24. An analog optical processor device comprising:

a first non-uniform optical device representing a first mathematical construct and having a plurality of sub-devices organized into a plurality of groups, each group representing a component of the first construct, the sub-devices of the group representing a grayscale response of the component of the first construct; and,

a second non-uniform optical device representing a second mathematical construct, at least substantially matched to the first non-uniform optical device such that optical interconnects between the first and the second optical devices are irregular, and having a plurality of sub-devices organized into a plurality of groups, each group representing a component of the second construct, the sub-devices of the group representing a grayscale response of the component of the second construct,

wherein light traveling through the first and the second optical devices represents a product of the first and the second mathematical constructs.

25. The device of claim 24, further comprising an analog-to-digital processor to subtract any errors in the product that remain even after substantially matching of the first and the second optical devices.

26. The device of claim 24, further comprising a detector array to detect the light traveling through the first and the second optical devices representing the product.

27. The device of claim 26, further comprising one or more prisms to achieve the irregular optical interconnections between the second optical device and the detector array.

28. The device of claim 24, further comprising one or more prisms to achieve the optical interconnections between the first and the second optical devices that are irregular.

29. The device of claim 24, further comprising one or more prisms to achieve the irregular optical interconnections between the first optical device and the second optical device.

30. The device of claim 24, wherein at least one of the first and the second optical devices is a spatial light modulator (SLM).

31. The device of claim 24, wherein the first mathematical construct is a vector and the second mathematical construct is a matrix, such that the product is a matrix-vector product.